

I. Executive Summary

This plan on labeling and source separation of mercury-added component parts in automobiles was prepared by the Department of Environmental Protection (DEP) at the direction of the Maine Legislature.¹ The plan provides for the safe removal and management of mercury-added components, for phase out of some automotive applications of mercury, and for labeling to identify mercury-added components in new cars. The legislation directing preparation of this plan is attached as Appendix A.

The Legislature required the plan to be developed in consultation with automobile manufacturers, dismantlers, and recyclers. Accordingly, the DEP convened an advisory group of interested parties to identify and discuss options for reducing mercury emissions to the environment from the recycling and disposal of automobiles. (A list of the advisory group members appears in Appendix B. Minutes of the advisory group meetings are available upon request.) Copies of the draft plan were circulated to the advisory group members and other interested parties. Comments received on the draft plan are also available upon request. The advisory group discussion focused on mercury switches in hood and trunk lighting and in some antilock braking systems, because these switches account for 99% of the mercury in the current motor vehicle fleet.²

Based on input from the advisory group, the Department recommends the following actions:

- Formalize in law the stated commitments by automobile manufacturers to phase out their use of mercury-added switches;
- Maintain the statutory prohibition against the crushing or shredding of an automobile that contains a mercury-added headlamp or switch;
- Provide for collection of mercury light switches before vehicle end of life by prohibiting the sale of used cars by larger volume dealers unless the switches have been removed, and by requiring automakers to remove the switches upon request of the car owner when the car is otherwise brought to a manufacturer-affiliated dealership for service;
- Require automobile manufacturers to provide a convenient system for collecting and recycling mercury switches removed from automobiles by used car dealers, auto dismantlers, auto crusher operators and others subject to State source separation directives;
- Facilitate the collection and recycling of mercury switches by allowing them to be managed as universal waste under the DEP hazardous waste management rules; and

- Approve the automakers' plan to use a doorpost label to identify mercury-added components in new vehicles offered for sale after July 15, 2002.

Proposed legislation to implement this plan is provided as Appendix C.

II. Mercury Components in Motor Vehicles

At the beginning of 2000, there were about 1.3 million registered motor vehicles in Maine, or roughly one vehicle for every man, woman and child in the state. These vehicles contain a variety of fluids and other components that can pose problems for the environment when the vehicle is handled at end of life. The proper management of these problematic components is an important and challenging task since about 10% of the vehicles on the road reach their end of life in a given year.

This plan focuses on management of component parts that contain mercury, a toxic metal that bio-accumulates in the environment. The auto industry over the years has used mercury in convenience light switches, antilock braking systems switches, ride control system switches, fluorescent lamps for dashboard backlighting, and high intensity discharge headlamps. A brief description of these mercury applications follows.

Mercury Light Switches

More than 99 percent of mercury used in motor vehicles is contained in switches, primarily for hood and trunk convenience lighting, but also in antilock braking systems (ABS).³ Convenience light switches reportedly accounted for about 87 percent of the total mercury in older vehicles. In this application, mercury "tilt" switches are used to turn the light on by making an electrical connection when the hood or trunk lid is lifted.⁴ Each switch contains about 0.8 grams of mercury.



A non-mercury alternative—a ball bearing switch that contains a silver plated copper ball—currently is being phased in for hood and trunk lighting in most new vehicles. The ball bearing capsule in the switch reportedly costs ten cents more than the comparable mercury capsule. Because the capsules are identical in size and shape, in many cases mercury light switches in the current vehicle fleet could be replaced with a ball bearing switch at any time during the life of the vehicle. Indeed, Ford recently provided non-mercury replacement switches to its dealers and found only in rare instances were non-

mercury replacements unavailable. As discussed further below, the ease and cost of replacement depends upon whether the plastic components of the light housing must be destroyed during capsule replacement and therefore replaced as well.

Antilock Braking Systems (ABS)

Antilock braking systems (ABS) contain two to three mercury switches per unit. In a 1995 white paper, the Society of Automotive Engineers reported that ABS switches accounted for 12 percent of the mercury in automobiles at that time.⁵

ABS switch unit for a Ford Explorer



ABS switch unit for a Jeep



The most common mercury-free alternative for antilock brakes uses a computerized system called an analog accelerometer.⁶ The two types of ABS are not interchangeable. Switching from a mercury g-sensor to a computerized analog accelerometer requires a design change in the vehicles.

Ride Control Systems

Ride control systems commonly rely on two to four mercury switches to adjust the suspension during cornering events. These units accounted for about one percent of mercury use in automobiles in 1995. The use of mercury switches in new ride control systems is reportedly discontinued.⁷ An integrated sensor can replace the mercury switch.⁸

Fluorescent Lamps and High Intensity Discharge Headlamps

High intensity discharge (HID) headlamps are offered as options in some high-end vehicles such as the Toyota Lexus and Mercedes Benz. These headlamps reportedly offer improved visibility, have a longer life span and use less energy than standard halogen or tungsten filament headlamps.⁹ Each HID headlight is believed to contain about 0.5 mg/mercury per lamp. Given their limited availability and cost - reported at between \$800 to \$1000 per vehicle - the numbers of HID headlamps currently in Maine vehicles likely are small.

Fluorescent lamps are used for background illumination in automotive displays. Typical uses are for backlighting instrument panels, navigation system displays, and cluster lighting. The amount of mercury in a typical backlighting lamp is about 2 mg. The extent of use of mercury backlighting is uncertain pending notification information submittals by manufacturers (pursuant to legislation passed last year) on the identification of makes and models with mercury lamp backlighting as well as the total amount of mercury used for this purpose. Many types of lighting units, including fluorescent lamps, may also be used in after-market exterior lighting, such as running board lights, spot lights, and decorative and other functional lighting options.¹⁰

Other Miscellaneous Uses

Other automobile parts that reportedly contained mercury include acceleration sensors for air bags, seatbelts, rechargeable batteries for radios, batteries for remote transmitters, switches for vanity mirrors, heated rear windows and speedometer systems.¹¹ Mercury (5-7 mg) can also be found in video display screens with liquid display crystals (LCDs). This plan does not address these uses as they are not well documented and do not appear to be widespread or significant in the aggregate.

Which vehicles have these parts?

There is no comprehensive inventory identifying the make, model and year of vehicles that contain mercury-added components. With regard to convenience light switches, automaker representatives indicate hood and trunk lights typically were offered as part of an options package, thus manufacturers are unable to provide model-specific information. In the case of ABS switches, manufacturers have not yet provided information on pre-2000 models despite several requests from the DEP and other organizations (see letters attached as Appendix D).

The Department has attempted to meet the need for better information on older vehicles by compiling a master list of available data from other sources in the public domain. This listing certainly is incomplete for years 1996 to 1999, and may contain other significant omissions. For model year 2000 and later motor vehicles, information filed by automakers with the State of Vermont under its product labeling law is considered the most reliable. (See Appendix E)

In addition to this DEP-generated master list, industry representatives have offered rules of thumb for identifying which vehicles have mercury light switches based on year and country of manufacture. European manufacturers phased out mercury convenience light switches by 1993, due in large part to a prohibition enacted by the Swedish government. Other foreign manufacturers followed suit such that, by 1996, only U.S. domestic automakers were still installing mercury light switches in new cars. A reported fourteen million switches were supplied to domestic manufacturers in 1995,¹² and they continued to rely heavily on mercury switches for convenience lights through calendar year 1999. According to the industry trade association, any vehicle 1999 and

older equipped with convenience lights made by Ford or General Motors, and any Chrysler vehicle 1998 and older is likely to have mercury switches.¹³

In October 2001, Ford discontinued the use of mercury switches in new cars. General Motors still uses mercury light switches in certain large vans (Chevy Express, GMC Savannah) and a SUV model (2 door Chevy Blazer), but GM intends to discontinue using mercury switches in new cars by the end of calendar year 2002. Chrysler's ABS system in 4-wheel drive Jeep Wranglers has mercury switches. Chrysler intends to discontinue this use by the end of calendar year 2002.

In the absence of a comprehensive inventory, there are varying estimates as to how many cars on the road have mercury switches. According to Ford, its post-1995 vehicle fleet has an average of 0.4 switches per vehicle on the road. DEP believes this estimate is low because it does not account for pre-1995 vehicles. The Clean Car Campaign calculated an average of 0.7 switches per registered Maine vehicle, based upon the age of Maine cars and known switch use for 2000 and earlier vehicles. This Clean Car Campaign estimate is very similar to DEP's experience in conducting a pilot program to remove mercury light switches from surplus state-owned vehicles prior to public auction. Under that program, DEP removed 79 switches from 120 vehicles (or 0.65 switches per vehicle) in the summer and fall of 2001. Using the 0.65 switches per vehicle average value, and assuming 0.8 grams per switch, the 1.3 million registered cars in Maine contain about 1500 pounds of mercury in switches alone. This estimate does not account for unregistered and junked vehicles.

How is mercury released into the environment?

Mercury in automobile components can be released to the environment in several ways. First, mercury can be released directly to the environment if the component is damaged or has corroded and begins to leak. Second, mercury can be released if the component is removed from the vehicle and placed in solid waste for landfilling or incineration. Studies show that mercury in the waste stream is released to the environment under both of these disposal scenarios.¹⁴

However, because mercury-added parts typically remain in the vehicle through its operating life, most of the mercury is released when the vehicle is processed at end of life (ELV). The mercury in ELV vehicles can be released when the vehicle is shredded, when the shredder residue or "fluff" is landfilled, or when the shredded metal - called shredder frag - is smelted to produce recycled steel. Preliminary data in Minnesota found that 7 percent of the mercury was emitted to the air during shredding of the automobile, 53 percent ended up in the shredder fluff, and 40 percent remained in the shredder frag.

The subsequent smelting of the shredder frag is the release scenario of perhaps greatest concern. According to the Minnesota study, almost 40 percent of the mercury in shredder frag is emitted directly to the environment during smelting. The remaining 60% is captured in flue dust by the smelter gas cleaning system. However, the

collected flue dust may then be pelleted to form briquettes for fueling the furnace, and in the process, more of the mercury is released to the environment.¹⁵

These secondary steel facilities are not regulated for mercury emissions at the federal level and typically do not employ mercury emissions controls. New Jersey and Ohio have data suggesting that mercury emissions from these types of facilities may be several orders of magnitude higher than indicated by data relied on by the United States Environmental Protection Agency in deciding not to set mercury emission limits on such facilities.¹⁶ The New Jersey data indicate that iron and steel manufacturing constitute the single largest source category of mercury emissions to the air in the state. Based largely on stack test data, six New Jersey facilities release an estimated 935 pounds of mercury to the air annually.

While there are only one, part-time auto shredding facility and no steel recycling facilities currently operating in Maine, regional and national emissions from auto recycling affect this state. A map indicating the location of these steel smelting facilities in the United States is provided as Appendix F. Emissions of elemental mercury vapor from these facilities can be expected to join the global atmospheric pool and contribute to mercury deposition in Maine. New Jersey, for example, acknowledges that it is a net mercury exporter, emitting more mercury into the air than it receives via deposition.

III. Source Reduction Recommendations

Source reduction - reducing the use of mercury-added parts in assembly of new autos - is integral to an effective strategy for reducing mercury emissions from automobile recycling. A strategy that relies solely on source separation and collection could facilitate the continued use of mercury components for which there are affordable and effective non-mercury alternatives. Collection systems are an unnecessary expense and an imperfect strategy for reducing mercury emissions where it is feasible to phase out the use of mercury, as is the case with the principal uses of mercury in vehicles.

As noted in Section II, more than 99 percent of the mercury in motor vehicles is contained in mercury switches for convenience lighting and antilock braking systems (ABS).¹⁷ This year, Oregon became the first state in the nation to prohibit the sale of vehicles that contain mercury light switches although the ban does not apply to vehicles manufactured before January 1, 2006. A European Union directive phases out the switches in vehicles put on the market after July 1, 2003.¹⁸

In light of these actions and the industry commitments described in Section II, the Department recommends banning the use of mercury switches in the sale of vehicles manufactured after January 1, 2003 unless the switch is necessary to protect public health and there are no reasonable alternatives. One of the possible exemptions to this prohibition would be recreational vehicles that have mercury safety switches to shut off gas flow in oven units, because there may be no suitable replacement for this safety feature at the present time.

DEP is not proposing a phase-out of other automotive mercury applications at this time. The other known applications either use much less mercury amounts or are far less prevalent. In addition, some mercury applications such as HID lamps raise potential issues regarding safety benefits, which are the subject of ongoing deliberations at the federal level.

DEP will continue to monitor mercury uses in automobiles through statutory notification requirements and other information sources. Should the status quo change to any significant degree, such as significant growth in non-switch mercury applications, DEP may revisit this issue on its own or in conjunction with the Mercury Products Advisory Committee.

IV. Source Separation, Collection, and Recycling

Several policy and practical considerations informed the development of the source separation aspects of this plan. Specifically, the DEP sought to develop a plan that is:

- Protective of human health while minimizing transaction costs;
- Convenient to vehicle owners;
- Fair to those responsible for removing mercury-added products; and
- Maximizes the capture rate for mercury-added components by providing multiple opportunities for their removal.

The multiphase approach takes advantage of opportunities to remove mercury-added components while vehicles are still in service rather than relying solely on removal from end of life vehicles (ELVs). Support for this approach emerged from advisory group observations on the varied nature of ELV handling. Automobile dismantlers, recyclers, junkyard operators, crusher operators, auto body shops, rebuilders, back yard mechanics and even logging truck owners looking for work during mud season all may be involved in scrapping vehicles. The sophistication of these operations is as varied as the cast of players.

In light of these observations, the advisory group decided to explore opportunities to remove mercury-added light switches before vehicles reach the scrap pile. At the same time, DEP was mindful of the need to limit the overall scope of the source separation program in the interest of administrative efficiency. The goal is to craft a program that provides multiple opportunities for switch removal, limits the number of participants involved to keep the program manageable, and shares program costs in a fair manner. By maintaining a program with a small group of players and multiple opportunities for removal or replacement, the relative efficiency and capture rates for the program can be maximized.

Program costs should not be borne solely by those responsible for physically removing the mercury switches. Automobile manufacturers who assembled the switches into their products also should bear responsibility. The auto industry has known since the early 1990s that its use of mercury switches poses an environmental threat and that

there are non-mercury alternatives. Yet in 2001, motor vehicles still are being sold to dealerships with mercury-added convenience lights and ABS switches. This principle of manufacturer responsibility for auto switch removal was recently endorsed by 25 state Attorneys General in a letter to Ford (see Appendix G).

The auto manufacturers contend that making them responsible for the safe management of their products at end of life is an unprecedented and inappropriate shift in public policy because it transfers the responsibility from the automobile dismantlers who are in the business of and profit from salvaging auto parts. DEP does not believe the policy is either unprecedented or inappropriate. Increasingly, manufacturers will be called upon to participate in waste management challenges they have created due to the volume and/or toxicity of their products (i.e., batteries, thermostats, and electronics). This principle of product stewardship is particularly appropriate where manufacturers are otherwise imposing significant waste management costs upon others (in either the public or private sector) due solely to decisions they made regarding the products they sold.

In this case, DEP also believes manufacturer responsibility is a crucial element in implementing an effective collection/recycling program. As the manufacturers and others acknowledge, many auto parts are currently collected and recycled if they have sufficient market value (i.e., batteries, catalytic converters). The problem with mercury switches is absent market intervention upon the part of the manufacturers, mercury switches have no value, and in fact represent a negative cash flow responsibility to the ELV handlers. The manufacturers suggest this economic disincentive can be overcome through regulation and enforcement, but DEP believes a market-based solution which provides some financial incentives for mercury switch collection/recycling offers the greatest promise for an effective program. The proposed legislation is intentionally written so that manufacturers are provided maximum flexibility to develop a market-based program that will work in Maine.

Removal of switches from vehicles on the road

The advisory group identified three opportunities to remove and recycle mercury-added convenience light switches from automobiles that are still on the road. The Department recommends pursuing two of these - a manufacturer sponsored removal program and removal by used car dealers - as discussed below.

1. Removal as a condition of annual motor vehicle inspection

Requiring switch removal as part of Maine's annual automobile inspection program was identified as a source separation option and rejected for several reasons. First, inspection station operators are not currently required to lift the hood or trunk lid in conducting vehicle inspections, and a switch removal requirement therefore would add a task that is not accounted for in the current inspection fee. Second, most car owners expect to be in and out fairly quickly for a standard inspection. Removal and

replacement of convenience light switches could add several minutes to the inspection.

Third, there are over 3000 licensed inspection stations and only nine State Police officers dedicated to overseeing their operation. While removing the light switches at vehicle inspection should in theory capture all switches in registered vehicles within one or two years, it could take a long time to get the program up and running given the need to train thousands of inspection station personnel on locating, removing, replacing, storing and recycling the switches. State police experience in implementing Clean Air requirements at inspection stations within Cumberland County indicates that a statewide inspection station program to safely remove and recycle mercury switches would pose an extraordinary compliance challenge.

Finally, removal could leave some car owners involuntarily without a functioning convenience light where the mercury switch cannot be replaced with a non-mercury switch. Some owners may be displeased with such an outcome. The pre-end-of-life removal opportunities discussed in paragraphs 2 and 3 below avoid this problem.

2. Manufacturer sponsored voluntary switch removal

Automakers should be required to establish and promote a voluntary switch removal program under which vehicle owners would be given the option of having mercury light switches removed at no charge. This service would be offered through manufacturer-affiliated dealerships and would be performed upon customer request when vehicles are brought in for maintenance or repair. Where possible, customers could be offered the option of replacing the mercury switch with a non-mercury switch so that the convenience light remains functional. Under the plan, the manufacturer or auto dealer may charge the customer for providing a replacement switch. Ford recently replaced its dealer inventories with non-mercury switches, and reimbursed its dealers for the mercury switches returned to the manufacturer. The other manufacturers would need to replace their inventories as well to the extent they wished to offer customers the option of switch replacement.

The Department will assist manufacturers in publicizing and promoting the program, and in distributing educational information explaining why the switches are being removed. The Department also will supply doorpost stickers for use in identifying vehicles from which the mercury light switches have been removed, information that will be needed when the vehicle is dismantled for recycling at end of life.

3. Removal by used car dealers

Most motor vehicles are re-sold one or more times in their life span, often by a licensed used car dealer. In calendar year 2000, about 1,400 licensed dealers sold over 110,000 used cars. 579 dealers who sold at least 20 vehicles accounted for 90 percent of the sales. If these dealers were required to prep the vehicles by removing or replacing mercury switches from hood and trunk light assemblies, the State could

expect to achieve a fairly high switch capture rate from vehicles that are still on the road. By focusing on dealers who sell 20 or more used vehicles at retail annually, the Department can target its limited resources for training, oversight and inspection where the most can be accomplished. The requirement to remove the switches would apply to retail sales only.

To defray costs to used car dealers, automakers would be required to arrange for consolidation and recycling of the switches removed by individual dealers. In addition, manufacturers would be required to establish "appropriate business arrangements" with either individual dealers or dealer groups. Such business arrangements may include reasonable compensation for removal costs if needed to facilitate the effective removal and collection of the switches. The Department is intentionally leaving the details of the business arrangements to the affected parties, but notes the "business arrangements" need not be complex or contractual. For example, the manufacturers may simply elect to provide a "bounty" for switches brought to consolidation points by used car dealers. Given the limited costs associated with switch removal (see discussion below), DEP believes payment of \$1.00 per switch may be sufficient to accomplish the objectives of the program.

To the extent used car dealers incur costs that are not covered by their arrangement with manufacturers, dealers may be able to recover such costs as part of the used car purchase price. This switch removal opportunity is attractive in part because the cost of removing and recycling the switch (and replacing it if the dealer chooses) presumably could be reflected in the used car purchase price. If the switch is removed and not replaced, the purchaser buys "as is" and the purchase price presumably reflects the absence of the convenience light. If the dealer replaces the mercury switch with a non-mercury switch, the dealer presumably will set the sales price to include the replacement cost.

As with the manufacturer sponsored removal option, the Department will supply stickers to be affixed to the vehicle doorpost so that persons handling the vehicle in the future will know the mercury light switches have been removed.

Removal of mercury components at vehicle end of life

When a vehicle reaches the end of its useful life, it usually is dismantled for parts that have re-sale value and the rest is crushed and shredded for recycling. Any mercury-added switches remaining in the vehicle at this point, including those in antilock braking sensorsⁱ should be removed for recycling before the vehicle hulk is crushed. Mercury-containing headlamps also should be removed.

A number of players are involved in preparing end-of-life vehicles (ELVs) for crushing, including automobile recyclers, junkyard operators and auto rebuilders. They may prepare the vehicle for crushing themselves or hire a mobile crushing crew that preps

ⁱ Mercury switches in ABS sensors can only be removed at vehicle end of life because there is no mercury free replacement part that could be installed while the vehicle is still on the road.

the vehicle to meet regulatory requirements for removal and proper handling of waste oil, gasoline and gasoline tanks, engine coolant, lead-acid batteries and Freon from air-conditioning systems. Mercury switches and headlamps should be added to this list of problematic ELV components that require special handling.

New England Metal Recycling (NEMR) currently crushes 75 percent of the automobiles in Maine. The remaining 25 percent are shipped to Canada for processing. NEMR employs two to four crushing crews depending on the time of year and the demand for scrap metal from automobiles. NEMR could either train these crews to remove the mercury components or require that the components be removed as a condition of accepting a vehicle for crushing from dismantlers, junkyard owners and others.

The Department will help those involved in ELV management by providing training and other technical assistance. Automakers would be required to consolidate the switches from the various points of removal and recycle them in the same manner as required for switches removed by used car dealers, and establish appropriate business arrangements with ELV businesses as needed to facilitate the effective removal and collection of the switches.

Several stakeholders urged DEP to require source separation and recycling of all mercury components in automobiles, particularly fluorescent backlighting. DEP has chosen not to do so because source separation would be difficult and very expensive to perform as a practical matter. DEP consulted with other NEWMOA states regarding this source separation issue, and DEP's position is consistent with how other states currently intend to implement their source separation requirements.

V. Measures of Success

Several commenters on the draft plan urged the Department to incorporate an explicit performance standard into the plan and implementing legislation in order to ensure the effectiveness of the program. A capture rate of 90% was proposed as the performance standard.

DEP concurs that a measure of effectiveness is needed for the program, so that the progress of the program can be evaluated against an objective yardstick. DEP is not adopting the suggested 90% capture rate as the measure of success because of the uncertainty surrounding the actual number of switches currently on Maine's roads. While DEP can derive a reasonable estimate of the number of switches, using a percentage performance standard (particularly one as high as 90%) would place undue weight on this estimate. It is also unclear how DEP would determine how many cars are retired in a given year, and which particular ones had mercury switches, without adding significant additional reporting requirements to the program.

Instead, DEP proposes that the performance standard for the source separation program is the annual removal of at least 90 pounds of mercury from Maine automobile components that would otherwise be available for release into the environment. The 90

pounds corresponds to about 51,000 switches, a reasonable objective at program initiation. DEP has not placed this standard in its proposed legislation because it should be periodically reviewed and adjusted, perhaps by the Mercury Products Advisory Committee.

Several commenters also requested that the manufacturers be required to submit a plan to the Department for its review and approval so that DEP can ensure the business relationships and other activities to be undertaken by the manufacturers under this plan constitute a good faith effort to meet the program objectives. The Department believes such a formal review and approval process could unnecessarily delay implementation of the program. It also raises issues such as the type of administrative process to be used for reviewing the plan, and whether a DEP decision on the plan is reviewable by the Board of Environmental Protection and/or the judiciary. DEP can work with the manufacturers to ensure compliance with the law without a formal plan review and approval process.

VI. Costs

Labor is the major cost element in removing mercury-added vehicle components for recycling. The labor cost depends on the time required to perform the task and the removal facility shop rate, which can range from \$20 to \$50 per hour.

By focusing the switch removal program primarily on larger used car dealers, new car dealers and crusher crews, the Department believes the time needed to remove the mercury switches can be reduced through repetition and training to the point where removal can occur within several minutes. Based on pilot removal projects conducted by the New York Department of Environmental Conservation and the Maine Department of Environmental Protection,ⁱⁱ removing convenience light switches takes one minute or less on average; removing and replacing them with a non-mercury switch takes five minutes or less on average. Removal of mercury-containing ABS units likely will take longer based on preliminary data compiled by the Ecology Center, a Michigan-based environmental organization.

Recycling costs for the mercury light switches are \$3 per pound, or about \$27 for a full one-gallon container of switches,ⁱⁱⁱ plus a pickup or transportation charge ranging from \$50 to \$150 (assume \$100). Recycling costs for ABS switches are uncertain at this time and likely will be significantly higher because the switches are embedded in molded plastic.

ⁱⁱ In the Maine pilot project, mercury light switches were removed from the hood and trunk lids of surplus state vehicles prior to sale at public auctions in July and September. Where feasible, the switch was replaced with a non-mercury switch so that the vehicle still has an operating convenience light. A total of 79 mercury hood and trunk light switches were removed; 66 of the switches were replaced successfully with a non-mercury ball bearing switch.

ⁱⁱⁱ A one-gallon container will hold about 4,000 mercury light switch capsules. Assuming each switch capsules contains 0.8 gram of mercury, the container will weigh about 9 pounds when full.

Except for switch recycling, the non-labor costs associated with convenience light switch removal are relatively minor. They include the cost of a mercury spill kit (about \$35) for cleanup in the unlikely event one of the metal-encased switches leaks and the cost of a one-gallon containers (about \$6) to safely store the switches pending recycling. The Department will supply the universal hazardous waste labels (85¢ each) that must be placed on the storage container as required under DEP rules.

Based on the above assumptions, the Department calculates that program costs for removal and recycling of mercury light switches without replacement will range from 40¢ to 90¢ per switch. If the switch is replaced, the overall cost could be significantly higher; particularly where franchise agreements may dictate billing rates.

VII. Management of Mercury-Added Switches as Universal Waste

The Department, in consultation with interested parties, will shortly initiate rulemaking proceedings to establish standards for managing mercury-added switches as universal hazardous waste. Specifically, the Department's current Hazardous Waste Management Rules will be revised to include "mercury devices" as a new category of universal waste that encompasses mercury-added convenience light switches and ABS switches. The proposed storage and handling standards for mercury devices will be tailored to make recycling safe and economical.

The standards under consideration for mercury devices would allow generators to accumulate up to 4000 mercury automotive switches, a number based on the maximum capacity of a one-gallon storage container. The switches would have to be shipped to a central accumulation, consolidation or recycling facility within 90 days after the container becomes full or every three years after switches are first placed in the container, whichever is earlier.

HID headlights meet the lamp definition under the current version of the universal waste rules. Accordingly, they are subject to the same regulatory requirements that apply to fluorescent and other mercury-added lamps and they should be handled in the same manner.

VIII. Labeling

Maine law prohibits the sale of new automobiles after July 15, 2002, unless mercury-added component parts are labeled or the manufacturer implements a DEP-approved alternative to labeling. The main purpose of labeling is to identify any such components so that they can be handled properly to avoid emissions to the environment when the vehicle is serviced, dismantled or shredded.

The two trade associations^{iv} representing most manufacturers of automobiles sold in North America have jointly requested DEP approval of a labeling plan identical to that approved for vehicles sold in the state of Vermont. The plan calls for manufacturers to attach a doorpost label identifying the vehicle components that contain or may contain mercury. A label would not be affixed directly to the individual components.

Vermont requires the doorpost label to be worded as follows:

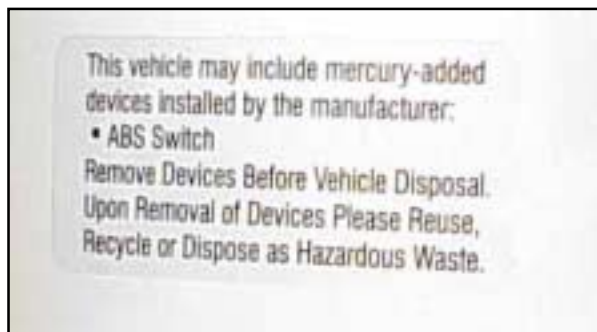
<p>This vehicle may include mercury-containing devices installed by the manufacturer:</p> <ul style="list-style-type: none">* ABS sensors* High Intensity Discharge Headlamps* Hood Convenience Light Switch <p>Remove Devices Before Vehicle Disposal Upon Removal of Devices: Please Reuse, Recycle, or Dispose as Hazardous Waste</p>
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The specific mercury-added component parts identified on the label will vary with vehicle type.

The Department recommends that this doorpost label be approved for use in identifying mercury-added components in new cars sold in Maine. The label is compatible with the source separation options discussed in Section IV of this plan and its approval will ensure Maine's labeling law is applied in a manner that is consistent with corresponding labeling programs in other states.

^{iv} The Alliance of Automobile Manufacturers (AAM) and the Association of International Automobile Manufacturers (AIAM).

Doorpost label on a 2001 Jeep Grand Cherokee offered for sale in Maine



¹ See 38 MRSA § 1665 as enacted by PL 1999, c. 779, §2, and amended by PL 2001, c. 373, §4.

² Ecology Center, Great Lakes United, University of Tennessee Center for Clean Products and Clean Technologies, *Toxics in Vehicles: Mercury*, January 2001, 7.
(can be found at: www.cleancarcampaign.org/pdfs/toxicsinvehicles_mercury.pdf)

³ *Id.* at 15.

⁴ Nachtman, J. and D. Hill, General Motors, “Mercury in Automotive Systems – A White Paper”, International Congress & Exposition, paper # 960409, Society of Automotive Engineers (SAE), Detroit, MI, February 26 – 29, 1996, 3.

⁵ *Ibid.*

⁶ Menke, Dean M., Pollution Prevention Alliance, *Toxic By Design, The Automobile Industry’s Continued Use of Mercury*, January 2001, 7.

⁷ Ecology Center, Great Lakes United, University of Tennessee Center for Clean Products and Clean Technologies, *Toxics in Vehicles: Mercury*, January 2001, 19.

⁸ Menke, Dean M., Pollution Prevention Alliance, *Toxic By Design, The Automobile Industry’s Continued Use of Mercury*, January 2001, 8.

⁹ Ecology Center, Great Lakes United, University of Tennessee Center for Clean Products and Clean Technologies, *Toxics in Vehicles: Mercury*, January 2001, 20.

¹⁰ *Id.* at 21.

¹¹ Menke, Dean M., Pollution Prevention Alliance, *Toxic By Design, The Automobile Industry’s Continued Use of Mercury*, January 2001, 6.

¹² Nachtman, J. and D. Hill, General Motors, “Mercury in Automotive Systems – A White Paper”, International Congress & Exposition, paper # 960409, Society of Automotive Engineers (SAE), Detroit, MI, February 26 – 29, 1996, 3.

¹³ Dana, Gregory J., Alliance of Automobile Manufacturers, and Cabaniss, John M., Association of International Automobile Manufacturers, Letter to David Lennett, Maine Department of Environmental Protection, May 24, 2001

¹⁴ Lindberg, S.E., et al., “Methylated mercury species in municipal waste landfill gas sampled in Florida, USA”, *Atmospheric Environment* 35 (2001) 4011-4015.

¹⁵ Ecology Center, Great Lakes United, University of Tennessee Center for Clean Products and Clean Technologies, *Toxics in Vehicles: Mercury*, January 2001, 30.

¹⁶ *Id.* at, 32 - 33.

¹⁷ *Id.* at, 7.

¹⁸ Directive 2000/53/EC of the European Parliament and the Council on End-of-Life Vehicles, September 18, 2000.